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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LIV. No. 9. SUPPLEMENTARY NUMBER.

INVITATION OF LADIES TO THE ORDINARY MEETINGS OF THE SOCIETY.

The attention of Fellows is called to the fact that ladies are only admitted to the Ordinary Evening Meetings of the Society by special invitation of the President, sanctioned by the Council. The invitations are issued at the commencement of each Session.

The present number of the *Monthly Notices* being the last of Vol. LIV., Subscribers (not Fellows) are requested to take notice that the subscription for Vol. LV., 10*s*., including postage, has now become due, and it is also requested that it may be forwarded to the Assistant-Secretary, Mr. W. H. Wesley, Burlington House, London, W., on or before the 1st of December next, otherwise it will be considered that the subscription has not been renewed.

MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LIV. SUPPLEMENTARY NUMBER. No. 9

Micrometrical Measures of the Diameters of Ceres, Pallas, and Vesta, made with the 36-inch Refractor of the Lick Observatory. By E. E. Barnard.

In *Astronomy and Astro-Physics* for May 1894 I have given the preliminary results of a series of measures of the diameters of three of the larger asteroids: *Ceres* (1), *Pallas* (2), *Vesta* (4).

In the present paper the details of these measures are given. I regret that much bad weather in the spring of the year prevented as many observations of these objects as I had intended to make. It requires good atmospheric conditions to see and measure these small bodies well.

It was intended to include *Juno* (3) in the list, but though I examined it several times I could not get a satisfactory image to measure, from the disturbed condition of the atmosphere. A series of measures of the satellites of *Uranus* and of the Ball and Ring system of *Saturn* were being carried on at this time also, and took up the best nights. No actual measures of *Juno* were made therefore, but I hope to get good measures of it as soon as it is again favourably placed for observing. I hope also to continue the measures of *Ceres*, *Pallas*, and *Vesta*.

Of these last *Ceres* was measured on nine nights, and *Pallas* and *Vesta* on five nights each.

In my paper on this subject in *Astronomy and Astro-Physics* I called attention to the fact that previous measures and estimates had placed *Vesta* as the largest of the asteroids. The present measures give that position to *Ceres*. This has created some surprise, but the question is clearly settled, not only by the measures themselves, but by the fact that, though *Ceres* was more distant than *Pallas* or *Vesta*, it appeared some two times larger in the telescope than either of them. This was very evident, as they were examined on the same nights and at the same time

turning the telescope from one to the other. It should therefore be accepted without hesitation that *Ceres* is the largest of the asteroids.

Following are the measures which have been made with the filar micrometer of the 36-in. equatorial.

The first column gives the measured diameter; the second gives this quantity reduced to the mean distance of *Ceres* from the Sun, viz. 2·7673.

Ceres.

	Obs'd.	At Δ 2·7673.	Deviation from Mean.
1894.	″	″	″
Mar. 11	0·95	0·55	−0·13
12	0·75	0·44	−0·02
25	0·72	0·43	−0·01
Apr. 1	0·73	0·44	−0·02
9	0·58	0·36	+0·06
16	0·60	0·39	+0·03
23	0·59	0·40	+0·02
30	0·58	0·40	+0·02
May 7	0·47	0·34	+0·08
		0·417	

or at distance unity 1″·155.

Pallas.

	Obs'd.	At Δ 2·7673.	Deviation from Mean.
1894.	″	″	″
Feb. 25	0·75	0·34	−0·10
26	0·59	0·26	−0·02
Mar. 11	0·44	0·21	+0·03
12	0·46	0·21	+0·03
25	0·40	0·20	+0·04
		0·244	

or at distance unity 0″·675.

Vesta.

	Obs'd.	At Δ 2·7673.	Deviation from Mean.
1894.	″	″	″
Mar. 11	0·38	0·23	−0·04
12	0·46	0·22	−0·03
25	0·33	0·16	+0·03
Apr. 1	0·39	0·20	−0·01
9	0·29	0·15	+0·04
		0·194	

or at distance unity 0″·536.

These values of the diameters would be represented in miles by—

Ceres 520 miles
Pallas 304 „
Vesta 241 „

These differ somewhat—and in the case of *Ceres* considerably—from the preliminary values (from the first three observations) as given in the paper in *Astronomy and Astro-Physics* referred to, viz.

Ceres 599 miles (0″·481 at Δ 2·7673 or 1″·330 at Δ 1)
Pallas 273 „ (0·211 „ „ 0·605 „)
Vesta 237 „ (0·191 „ „ 0·527 „)

The first few measures of *Ceres* were doubtless somewhat too large, as is shown in the series for that planet. We must remember, however, that the entire quantities themselves that are measured are very small in consideration of the great distance of the objects from us, a tenth of a second at the mean distance of *Ceres* being represented by 125 miles.

I have refrained from giving the probable errors of these results, for such seldom mean anything except to show the accordance of the measures among themselves. I have instead inserted a column of "deviations from the mean."

I think another year's measures will give fairly satisfactory diameters to these three asteroids—better, I believe, than can be obtained by any other method.

Mr. E. J. Stone's values for the diameters of these asteroids, viz.

Ceres 196 miles
Pallas 171 „
Vesta 214 „

were deduced from measures of *Ceres* and *Pallas* by Herschel and Lamont, whose instruments were certainly inadequate to deal with such quantities as the diameters of the minor planets.

Mount Hamilton:
1894 *August* 28.

Note on Professor Turner's Paper on the Reduction of Measures of Photographic Plates (*Monthly Notices*, vol. liv., 1893 November). By F. W. Dyson, M.A.

In Note IV. of this paper several small errors are made, which can easily be corrected in the margin, but which deserve to be noticed on account of the importance of the subject.

On p. 23, after "The coefficient of y_1 in the numerator x_2 is"

read $(-\sec P_2 \sin \overline{A_1 - A_2})/D$

$$= -X_{12} \cot P_1 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (14)$$

T T 2

After "The coefficient of x_1 in the numerator of y_2 is"

$$\textit{read } (\sec P_1 \sin \overline{A_1 - A_2})/D$$
$$= -X_{21} \cot P_2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (15)$$

These corrections should be carried through into formulæ (18) on p. 24. In the first line,

$$\textit{instead of } y_1 \, . \, X_{21} \cot P_2$$
$$\textit{read } -y_1 \, X_{12} \cot P_1,$$

and in the second line,

$$\textit{instead of } x_1 \, X_{12} \cot P_1$$
$$\textit{read } -x_1 \, X_{21} \cot P_2.$$

These rigorous formulæ ought to be used instead of the approximate ones at the bottom of the page, for although the coefficients of x_1 in the first line and y_1 in the second line only differ from unity by quantities of the second order, yet these differences are of the same order of magnitude as the constants a, b, &c., which would be obtained by comparison of the measures of two actual photographs.

These coefficients of x_1 and y_1 are found to be

$$1 - \tfrac{1}{2} (X_{12}^2 \cot^2 P_1 - Y_{12}^2).$$

and

$$1 - \tfrac{1}{2} (\cot P_1 \cot P_2 - 1) \, X_{12} \, X_{21}$$

to the second order, but there is no objection to computing the coefficients directly as they are given in formulæ (18), as Y_{12} approximates to $-Y_{21}$ in the general case (not to Y_{21}, as in the particular case given where the terms of the first order vanish), and consequently the fractions do not take an indeterminate form.

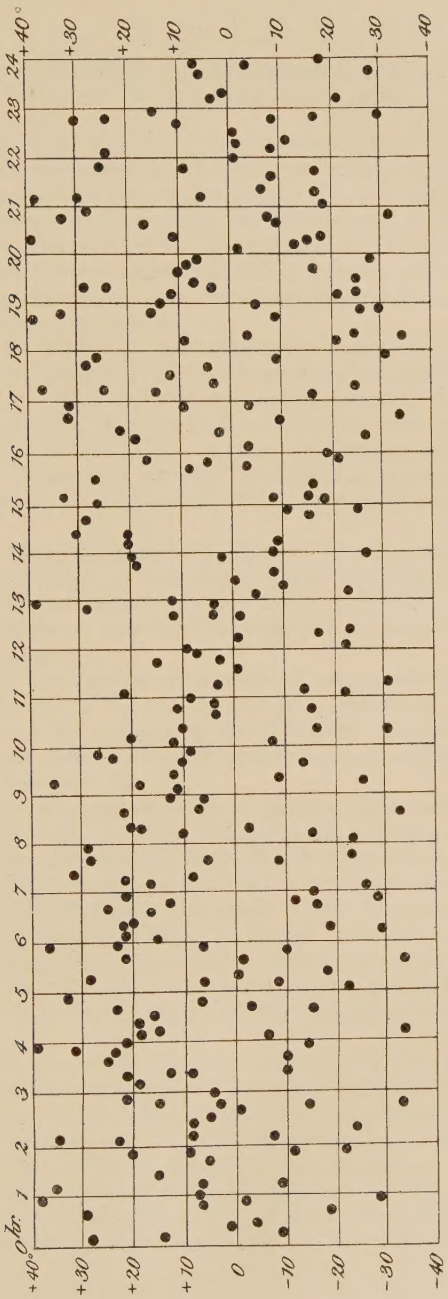
One other point which may be noticed refers to the paragraph at the end of Professor Turner's paper. Although

$$a_{1n} = a_{12} + a_{23} + \ . \ . \ . \ + a_{n-1 \, . \, n}.$$
$$c_{1n} \textit{ does not} = c_{12} + c_{23} + \ . \ . \ . \ + c_{n-1 \, . \, n}.$$

but differs from this by the sum of a number of terms of the form $a_{23} \, X_{12}$, $b_{23} \, Y_{12}$. The corrected form of this relation is rather cumbrous set down in a formula, but in practice would be quite easy to apply.

Blackheath:
1894 *September* 20.

[Mr. Dyson allows me to state here that I am much obliged to him for correcting these errors, the occurrence of which will be understood, and perhaps pardoned by those who have experienced the difficulties of breaking fresh ground.—H. H. T.]



Stars situated between + 40° and -35° dec. whose apparent places are given in the Nautical Almanac 1898.

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Note on Stars suitable for the Determination of Clock errors.
By A. M. W. Downing, M.A., D.Sc.

The total number of stars whose apparent places are given in the revised list contained in the *Nautical Almanac* for 1898 is 404, including sixteen close polar stars. It may, at the present time, be of interest to show (with special reference to Mr. Stone's paper in the last number of the *Monthly Notices*) the distribution of the *Nautical Almanac* stars situated between + 40° and — 35° dec., and which, therefore, with few exceptions, are suitable for the determination of clock-errors.

The diagram (Plate 13) shows the general distribution of the stars referred to, including *all* the Greenwich clock-stars and sixty additional stars. The adopted places of many of these latter stars are, necessarily, at present of considerably inferior accuracy to those of the former. The names, magnitudes (taken from the *Harvard Photometry*, or the *Uranometria Argentina*), and approximate mean places for 1898 of the sixty additional stars are appended.

It will be seen that the distribution is not altogether an ideal one, but may, perhaps, be considered fairly satisfactory, bearing in mind the various claims that had to be adjusted, as equitably as was practicable, in making the selection for such a work as the *Nautical Almanac*.

Although I had not the advantage of seeing Mr. Stone's list of proposed additions to the Greenwich clock-stars in time to make any use of it in revising the *Nautical Almanac* stars, it will be observed that fourteen of these proposed additions are in the *Nautical Almanac* list.

I may take the opportunity of stating that arrangements have been made with Professor Tietjen for the exchange of certain portions of the calculations made for the German and English Ephemerides, in extension of the system of co-operation already established with Professor Newcomb. The computing energy thus set free cannot, perhaps, be better utilised than by still further enlarging the list of stars whose apparent places are given in the *Nautical Almanac*, and thus improving the general distribution of those situated in the neighbourhood of the equator.

It may not be out of place to remark that the time seems almost ripe for the realisation of a project that has long been a desideratum in practical astronomy—*i.e.* the adoption of a uniform system of clock-stars in the astronomical ephemerides of different nations. The advantages of such a step are sufficiently obvious, and have recently been pointed out by Professor Hall (*Astronomical Journal*, No. 321). I trust that, before many years have passed, it may be possible to carry out this much-needed reform.

Stars (other than Greenwich Clock-stars) whose apparent places are given in the Nautical Almanac 1898.

Star.	Mag.	Approximate R.A. h m s	Dec. ° ′
α Sculptoris	4·1	0 53 41	−29 55
ζ Ceti	3·8	1 46 25	−10 50
υ Ceti	3·8	1 55 12	−21 34
β Trianguli	3·1	2 3 28	+34 30
κ Fornacis	5·4	2 17 53	−24 17
π Ceti	4·3	2 39 16	−14 17
β Fornacis	4·7	2 44 49	−32 50
ζ Persei	3·1	3 47 43	+31 35
ε Persei	3·0	3 51 0	+39 43
υ^4 Eridani	3·3	4 14 2	−34 3
53 Eridani	3·9	4 33 30	−14 30
π^1 Orionis	3·3	4 44 18	+ 6 47
γ Orionis	1·9	5 19 40	+ 6 15
ζ Tauri	3·0	5 31 33	+21 5
θ Aurigæ	2·7	5 52 46	+37 12
ζ Canis Maj.	3·0	6 16 24	−30 1
ε Geminorum	3·2	6 37 39	+25 14
α Canis Maj.	−1·4	6 40 39	−16 35
δ Canis Maj.	1·9	7 4 15	−26 14
γ Monocerotis	4·2	7 36 22	− 9 19
20 Puppis	5·1	8 8 39	−15 29
30 Monocerotis	3·9	8 20 34	− 3 34
α Mali	3·6	8 39 30	−32 49
ζ Hydræ	3·3	8 50 0	+ 6 20
α Lyncis	3·4	9 14 51	+34 49
h Mali	4·9	9 16 58	−25 32
κ Hydræ	4·9	9 35 25	−13 52
22 Sextantis	5·4	10 12 34	− 7 34
α Antliæ	4·5	10 22 29	−30 33
ν Hydræ	3·3	10 44 36	−15 40
β Crateris	4·4	11 6 38	−22 16
ξ Hydræ	3·8	11 27 59	−31 18
γ Virginis	2·8	12 36 29	− 0 53
α Canum Ven.	3·0	12 51 15	+38 52
γ Hydræ	3·4	13 13 22	−22 38
π Hydræ	3·5	14 0 34	−26 11

Star.	Mag.	Approximate R.A. h m s	Dec. ° ′
20 Libræ	3·2	14 58 6	−24 53
δ Boötis	3·5	15 11 23	+33 42
μ Serpentis	3·5	15 44 18	− 3 7
δ Scorpii	2·5	15 54 18	−22 20
β Herculis	2·8	16 25 50	+21 43
ϵ Scorpii	2·2	16 43 33	−34 6
30 Ophiuchi	5·0	16 55 41	− 4 4
δ Herculis	3·3	17 10 50	+24 58
π Herculis	3·4	17 11 30	+36 55
ν Ophiuchi	3·5	17 53 25	− 9 46
γ^2 Sagittarii	3·0	17 59 15	−30 26
ϵ Sagittarii	2·1	18 17 24	−34 26
σ Sagittarii	2·3	18 48 56	−26 25
λ Aquilæ	3·6	19 0 50	− 5 2
π Sagittarii	3·1	19 3 42	−21 11
β Cygni	3·1	19 26 36	+27 45
γ Cygni	2·3	20 18 34	+39 56
ϵ Cygni	2·7	20 42 5	+33 35
1 Piscis Aust.	5·0	20 55 2	−32 39
61 Cygni	5·1	21 2 20	+38 15
η Pegasi	3·1	22 38 13	+29 41
δ Aquarii	3·4	22 49 14	−16 22
c^2 Aquarii	3·6	23 4 0	−21 44
27 Piscium	5·0	23 53 27	− 4 7

Nautical Almanac Office:
1894 *October* 3.

On the Proper Motions of Groombridge 1172, *W.B.* (2) *XII.* 740–1, W.B. *XII.* 632. By A. C. D. Crommelin.

These stars have all been used as comet comparison stars at Greenwich in the last twelve months, and on comparing recent Greenwich observations with the older ones they appear to have sensible proper motions. Struve's precessions have been used throughout in bringing the places up to 1894·0. Two cases where the exact epoch of the original observation could not be found are indicated with an asterisk.

Groombridge 1772, *mag.* 6·5.

This star was used in a comparison with Comet *b* 1894 (Gale). The places given are reduced to 1894·0 without proper motion.

Catalogue.	R.A. 1894·0. h m s	N.P.D. 1894·0. ° ′ ″	Epoch.	No. of Obs.
Lalande 21652	11 16 56·241	49 14 33·50	1793·3	1
Groombridge 1772	56·049	36·30	1811·3	5
W.B. (2) XI. 264	56·248	(24·20)	1831·24	1
Rumker	55·947	35·35	1840*	1
Radcliffe	55·950	34·98	1845·9 1847·1	5 R.A. 5 N.P.D.
Paris III.	55·473	35·44	1881·3	3 R.A., 2 N.P.D.
Greenwich 1887	55·613	36·37	1887·37	1
,, 1888	55·564	37·12	1888·34	1
,, 1890	55·496	37·21	1890·28	1

The N.P.D. of *W.B.* (2) appears to be 10″ too small. A proper motion of $-0^{s}\cdot0084$, $+0''\cdot025$ represents these as follows :—

Catalogue.	R.A. 1894·0. h m s	N.P.D. 1894·0. ° ′ ″	
Lalande	11 16 55·395	49 14 36·02	
Groombridge	55·355	38·37	
W.B. (2)	55·721	(35·77)	(corrected by + 10″)
Rumker	55·493	36·70	
Radcliffe	55·546	36·15	
Paris (III.)	55·367	35·76	
Greenwich 1887	55·557	36·54	
,, 1888	55·516	37·26	
,, 1890	55·465	37·30	
Weighted Mean	11 16 55·461	49 14 36·87	

W.B. (2) XII. 740–1, *mag.* 8·7.

There is only a presumption of proper motion in this case, since no observations have been found intermediate between the two by Bessel and the recent ones at Greenwich. The star was used for Comet *c* 1893 (Brooks) on 1893 October 25.

Catalogue.	R.A. 1894·0.	N.P.D. 1894·0.	Epoch.	No. of Obs.
	h m s	° ′ ″		
W.B. (2) XII. 740	12 37 3·044	71 8 32·50	1826·35	1
„ „ 741	3·284	29·90	„	1
Greenwich 1894	2·783	23·31	1894·23	3

The indicated proper motion is $-0^{s}\cdot0057$, $-0''\cdot116$.

W.B. XII. 632, *mag.* 8·5.

This star was used for the same comet on 1893 October 18. There seems no doubt of its having a large proper motion in R.A.

Catalogue.	R.A. 1894·0.	N.P.D. 1894·0.	Epoch.	No. of Obs.
	h m s	° ′ ″		
Lalande 23763	12 39 37·107	75 55 (33·40)	1795·2	1
W.B. XII. 632	(27·656)	43·47	1825*	1
Yarnall	36·008	44·43	1864·8	9 R.A.
			1866·3	2 N.P.D.
Greenwich 1894	35·410	45·07	1894·23	3

The N.P.D. in *Lalande* and the R.A. in *W.B.* seem too small by 10″ and 10^{s} respectively. A proper motion of $-0^{s}\cdot0185$, $+0''\cdot021$ represents the above places as follows:—

Catalogue.	R.A. 1894·0.	N.P.D. 1894·0.	
	h m s	° ′ ″	
Lalande	12 39 35·279	75 55 (45·47)	(corrected by + 10″)
W.B.	(36·379)	44·92	(R.A. corrected by $+10^{s}$)
Yarnall	35·468	45·01	
Greenwich	35·414	45·07	

Weighted mean (rejecting *W.B.* in R.A.) $12^{h}\ 39^{m}\ 35^{s}\cdot441$, $75^{\circ}\ 55'\ 45''\cdot09$.

The two stars *W.B.* (2) X.417–8, *W.B.* (2) X.480, mags. 8·8, 9·0 repectively, whose probable proper motion was alluded to by Sir R. S. Ball (*Monthly Notices*, liv. 8, p. 555), occur in the Leiden zones. The places reduced to 1894·0 are as follows:—

Catalogue.	R.A. 1894·0. h m s	N.P.D. 1894·0. ° ′ ″	
W.B. (2) X. 417	10 23 22·51	57 27 8·6	1830·27
„ „ 418	22·85	6·3	1831·27
Leiden Z. 287	21·89	5·4	1873·22
„ 288	21·97	4·9	1873·22
W. B. (2) X. 480	10 26 28·53	57 29 53·0	1830·27
Leiden Z. 169	29·22	52·0	1872·19
„ 281	29·31	51·3	1873·19

There seems to be a sensible proper motion in R.A. in each case, the values indicated being $-0^{s}\cdot0177$, $+0^{s}\cdot0173$ respectively.

Observations of Comet b 1894 *(Gale) made at the Royal Observatory, Greenwich.*

(Communicated by the Astronomer Royal.)

The observations were made with the Fast, or Sheepshanks, equatorial, aperture 6·7 inches, by taking transits over two cross-wires at right angles to each other, and each inclined 45° to the parallel of declination. Magnifying power 55. On July 11 the observations were made with the 28-inch equatorial.

Greenwich Mean Solar Time.	Observer.	☄−★R.A.	Corr. for Refraction.	Log factor of Parallax.	☄−★N.P.D.	Corr. for Refraction.	Log factor of Parallax.	No. of Comps.	Apparent R.A.	Apparent N.P.D.	Comp. Star.
1894. d h m s		m s	s		′ ″	″			h m s	° ′ ″	
June 7 12 13 45	B.	+2 44·14	0·00	9·6867	− 0 40·8	0·0	0·7171	3	11 19 41·43	49 13 50·3	*a*
21 10 59 4	,,	−0 0·45	0·00	9·6901	− 1 8·6	0·0	0·6255	3	...	...	*b*
22 11 28 6	A.C.	+1 58·48	0·00	9·6999	− 5 45·8	−0·1	0·6735	2	...	...	*b*
22 11 28 6	,,	+1 16·28	0·00	9·6999	+ 7 20·4	+0·1	0·6735	2	...	...	*c*
24 11 8 27	H.	+1 24·80	0·00	9·6971	+ 5 41·7	+0·1	0·6480	4	11 56 24·45	46 54 52·6	*d*
24 11 33 29	,,	−0 31·94	0·00	9·7021	−10 10·5	−0·2	0·6866	4	...	...	*e*
28 11 19 3	,,	+2 19·88	0·00	9·6994	− 3 31·7	−0·0	0·6521	6	12 4 4·27	46 41 19·9	*f*
28 11 19 3	,,	+1 25·83	0·00	9·6994	− 1 9·5	+0·0	0·6521	6	12 4 4·54	46 41 19·6	*g*
29 10 44 43	C.D.	−0 38·00	0·00	9·6941	+ 9 22·9	0·0	0·6233	3	12 5 59·12	46 38 41·7	*h*
29 10 51 23	H.F.	−0 38·42	0·00	9·6967	+ 9 36·1	+0·1	0·6344	3	12 5 58·70	46 38 55·0	*h*
30 11 20 25	A.C.	+1 15·66	0·00	9·7041	+ 7 6·4	+0·1	0·6831	4	12 7 52·76	46 36 25·3	*h*

Greenwich Mean Solar Time.	Observer.	✐ − ✱ R.A.	Corr. for Refraction.	Log factor of Parallax.	✐ − ✱ N.P.D.	Corr. for Refraction.	Log factor of Parallax.	No. of Comps.	Apparent R.A.	Apparent N.P.D.	Comp. Star.
1894 d h m s		m s	s			″			h m s	° ′ ″	
July 2 10 57 10	H.	−0 34·37	0·00	9·7013	− 3 58″·3	0″·0	0·6533	6	12 11 32·14	46 32 52″·4	*i*
3 11 25 23	A.C.	+1 18·63	0·00	9·7053	− 5 46·9	−0″·1	0·6990	3	12 13 25·12	46 31 3·7	*i*
7 10 46 3	,,	+1 21·45	0·00	9·7019	+ 7 34·3	0·0	0·6514	1	12 20 34·44	46 27 0·0	*k*
7 10 48 56	,,	+0 52·31	0·00	9·7026	− 6 10·9	−0″·1	0·6561	1	12 20 39·78	46 27 12·3	*l*
11 11 20 57	M.	+0 47·32	0·00	9·7051	+ 1 5·9	0·0	0·7163	7	...	...	*m*
11 11 21 26	,,	−0 25·76	0·00	9·7051	+ 2 33·3	0·0	0·7169	6	...	...	*n*
11 11 30 42	,,	+1 24·91	0·00	9·7040	+ 2 50·0	0·0	0·7291	1	...	...	*o*
11 11 30 42	,,	+1 7·88	0·00	9·7040	+ 3 11·7	0·0	0·7291	1	...	...	*p*

Notes.

The observations are corrected for refraction, but not for parallax. They are also corrected for the error of inclination of the wires, and for the motion of the comet.

June 21.—Very difficult and doubtful observations; sky very hazy; observations impaired also by glow from great fire in Finsbury.

June 22.—Comet faint; cloudy.

June 24.—Comet very faint and diffused.

June 28.—Comet exceedingly faint.

July 2.—Comet excessively faint; very hard to see.

July 3.—Comet very faint and ill-defined.

July 7.—The comet was excessively faint; observations rough. The observations of R.A. are very discordant, but no mistake has been detected.

July 11.—The comet was exceedingly diffused and faint; no shape could be detected, certainly no nucleus. Generally it could be seen only by partly averted vision.

The initials M., H., A.C., B., H.F., C.D., are those of Mr. Maunder, Mr. Hollis, Mr. Crommelin, Mr. Bryant, Mr. Furner and Mr. Davidson respectively.

Comparison Stars.

Star's Name.	R.A., 1894·0 h m s	N.P.D., 1894·0 ° ′ ″	Authority.
a. Groombridge, 1772	11 16 55·51	49 14 37″·0	Greenwich Observations, 1887, –88, –90, with P.M. – 0ˢ·ᵒᵒ84 + 0″·025.
b. B.D. + 43°, 2167	11 50 29·1	47 8·2	Bonn Observations, vol. v.
c. B.D. + 43°, 2169	11 51 9·5	46 55·0	„ „
d. B.D. + 43°, 2174	11 54 57·86	46 49 16·3	„ „ vi.
e. B.D. + 43°, 2181	11 56 59·5	47 4·3	„ „ v.
f. W.B. (2) XI., 1183	12 1 42·63	46 44 56·9	Weisse's Bessel (2).
g. B.D. + 43°, 2191	12 2 36·94	46 42 34·3	Equatorial Comparisons with star *f* at Cincinnati (*Ast. Journ.* 323)
h. W.B. (2) XII., 95	12 6 35·34	46 29 24·0	Weisse's Bessel (2).
i. W.B. (2) XII., 198	12 12 4·75	46 36 55·7	„ „
k. W.B. (2) XII., 358	12 19 11·28	46 19 30·4	Pulkova Catalogue, 1875.
l. W.B. (2) XII., 373	12 19 45·76	46 33 28·0	Lalande and Weisse's Bessel (2).
m. B.D. + 43°, 2236	12 27 2·8	46 25·0	Bonn Observations, vol. v.
n. Anonymous	12 28 15	46 23	Difference from star *m*.
o. „	12 26 27	46 23	„ „ „
p. „	12 26 44	46 23	„ „

Royal Observatory, Greenwich:
1894 *September* 11.

Observations of Comet b 1894 (*Gale*).

(*Communicated by Sir R. S. Ball.*)

The Comet (Gale) was again observed here on the night of June 11. The place obtained from the observations is—

G.M.T. corrected for Aberrn.	Geoc. R.A.	Geoc. Decl.
1894.	h m s	° ′ ″
June 11·49565	11 29 14·77	41 36 3·2

Comparison Star. R.A. 1894·0.	Decl. 1894·0.	Authority.	No. of Comparisons.
h m s	° ′ ″		
11 33 19·40	41 43 56·8	W.B. 11^{h} 602	10

From this observation, combined with those made here on May 4 and May 23, Mr. Graham obtained the following parabolic elements of the orbit:—

Per. Pass. 1894 *April* 13·53750 *Greenwich M.T.*

$\pi - \Omega$	324° 19′ 21″·92	1894·0
Ω	206 20 55·81	
i	87 3 11·22	
log q	9·9928092	

Motion direct.

The difference between the observed and calculated places on May 23 is—

	In R.A.	In Decl.
	s	″
O − C	+0·12	−1·1

The Observatory, Cambridge:
1894 *June* 27.

Observations of Comet b 1894 (*Gale*) *made at the Royal Observatory, Cape of Good Hope.*

(*Communicated by David Gill, LL.D., F.R.S., H.M. Astronomer at the Cape.*)

1894.	Cape Mean Time.	Comet−Star. Δ α.	Comet−Star. Δ δ.	No. of Comps.	Observer.	Comet's App. R.A.	Log ($p \times \Delta$).	Comet's App. Dec.	Log ($p \times \Delta$).	Reduction to App. Place.		Comp. Star No.
	h m s	m s	″			h m s		° ′ ″		s	″	
Apr. 11	7 16 46·1	−0 55·79	−5 7·0	4·4	F.	3 30 27·31	9·919	−54 57 5·1	0·151*n*	−1·07	−1·9	1
12	7 46 7·1	−1 47·19	−3 42·0	12·8	F.	3 40 3·41	9·924	−54 40 13·4	0·328*n*	−1·07	−2·1	2
13	7 22 27·2	−0 29·64	+5 35·2	8·8	F.	3 49 51·57	9·910	−54 19 39·4	0·120*n*	−1·07	−2·4	3
17	7 7 5·3	−0 54·83	−2 42·3	8 8	F.	4 35 30·92	9·853	−51 55 36·6	9·654*n*	−0·99	−3·6	4
23	7 2 53·5	−0 30·02	+0 6·4	12·8	F.	5 59 19·05	9·695	−43 1 22·7	9·308*n*	−0·60	−6·4	5
24	8 4 59 6	+1 46·38	−0 8·2	12·8	F.	6 14 51·49	9·748	−40 30 14·6	0 139*n*	−0·51	−6·6	6
25	7 43 58·5	−2 24·24	−2 13·2	12·8	F.	6 29 30·01	9·691	−37 48 32·5	0·046*n*	−0·39	−7·0	7
26	8 32 43·6	+1 15·18	−1 12·3	12·8	F.	6 44 45·00	9·720	−34 39 00·0	0·316*n*	−0·29	−7·0	8
27	7 41 7·7	−2 16·16	−3 10·8	12·8	F.	6 58 41·54	9·618	−31 25 15·0	0·192*n*	−0·17	−7·1	9
28	7 40 56·1	−1 51·54	−2 2·6	12·8	F.	7 12 50·60	9·583	−27 47 49·4	0·274*n*	−0·06	−6·9	10
30	7 42 15·0	+0 28·26	−0 31·1	12·8	F.	7 39 50·45	9·518	−19 55 0·1	0·430*n*	+0·16	−6·0	11
May 1	7 50 6·4	+1 14·63	−2 34·8	12·8	F.	7 52 36·45	9·507	−15 46 27·0	0·503*n*	+0·26	−5·3	12
2	7 50 41·0	−1 14·99	−1 47·0	12·8	F.	...	9·480	...	0·560*n*	+0·37	−4·7	13
3	7 36 39·0	−1 34·18	+4 50·1	6·4	F.	...	9·415	...	0·607*n*	+0·47	−4·0	14
5	7 38 16·5	−2 22·80	−0 13·6	12·8	F.	...	9·373	...	0 693*n*	+0·66	−2·2	15

The observations were made with the filar micrometer and the 7-inch equatorial by Mr. W. H. Finlay. They are corrected for refraction.

Notes.

April 12.—Moonlight; comet bright and large; no well-defined condensation for observation.
April 24.—The comet showed a short faint tail.
May 1.—Definition extremely bad.

Comet b 1894 (*Gale*).

Assumed Mean Places of the Comparison Stars.

Comparison Star No.	R.A. 1894·0. h m s	Dec. 1894·0. ° ′ ″	Authority.
1	3 31 24·17	−54 51 56·2	Cape (1880), No. 1492
2	3 41 51·67	−54 36 29·3	„ „ 1586
3	3 50 22·28	−54 25 12·2	8½ mag. = Cape (1880), No. 1705 − 6ᵐ 56ˢ·05 + 2′ 27″·1
4	4 36 26·74	−51 52 50·7	Cape (1880), No. 2013
5	5 59 49·67	−43 1 22·7	9½ mag. = Cape (1880), No. 2750 + 2ᵐ 12ˢ·93 − 9′ 2″·5
6	6 13 5·62	−40 29 59·8	9½ mag. = Cape (1880), No. 2840 + 6ᵐ 20ˢ·60 − 9′ 55″·7
			and = „ „ 2904 − 1ᵐ 11ˢ·00 + 7′ 4″·0
7	6 31 54·64	−37 46 12·3	C.G.A. 8103
8	6 43 29·7	−34 38 (0)	Cape Photo. DM.
9	7 0 57·87	−31 21 57·1	C.G.A. 8941
10	7 14 42·20	−27 45 39·9	10 mag. = Cape (1880), No. 3534 + 2ᵐ 22ˢ·10 − 4′ 1″·1
11	7 39 22·03	−19 54 23·0	B.D. − 19·2035 = {O.A. 6080 / Paris 9604} − 5ᵐ 44ˢ·00 + 1′ 47″·8
			and = O.A. 6047 −4ᵐ 24ˢ·40 + 4′ 21″·7
12	7 51 21·56	−15 43 46·9	O.A. 6219. Also = O.A. 6199 +0ᵐ 46ˢ·72 − 4′ 51″·5
13	8 6	−11 36	B.D. − 11·2267
14	8 16	− 7 43	B.D. − 7·2453
15	8 40	+ 0 10	B.D. + 0·2380

Data for Computing the Positions of the Satellites of Jupiter 1894–95. By A. Marth.

The following data for computing the places of the satellites for the present apparition of *Jupiter* are a continuation of those for the three preceding apparitions published in the *Monthly Notices*. The motions of the longitudes and of the arguments, and the inequalities corresponding to the arguments, are to be found on pp. 524–539 of vol. li.

The last eclipses of Sat. IV., which occurred 1892 April 16, $13^{h}{\cdot}0$ Gr., and May 3, $7^{h}{\cdot}2$ Gr. (the latter not given by the tables), were not observable on account of *Jupiter* being too near the Sun. The next cycle of eclipses begins in 1895 February (the satellite remaining outside the shadow-cone at the nearest approach on January 17), but it is doubtful whether, on February 2 at $20^{h}\ 2^{m}$ Gr., the satellite will really be within the shadow-cone or merely skirt it (*v. Monthly Notices*, vol. xliv., p. 243), and Australian observers must be on the watch to remove the doubt. On February 19 observers in America will be favoured with the opportunity of observing a real eclipse, but of considerably shorter duration than that derived from the tables, and the next eclipse, on March 8, will be observable in Europe and Africa. Of course, care must be taken that the times noted at the satellite's disappearance and reappearance refer to corresponding phases.

An ephemeris of the fifth satellite is given in No. 3253 of the *Astr. Nachrichten.*

First Satellite.

Greenwich Noon. 1894–95.	Longitude. l_1-O	S_1	Arguments. α_1	β_1	γ_1	δ_1	ϵ_1
July 30	298°·8751	+·0039	·9821	·496	·748	·239	·234
Aug. 9	173·7647	39	·6551	·914	·396	·891	·259
19	48·6542	38	·3282	·332	·045	·543	·284
29	283·5438	37	·0012	·750	·693	·196	·308
Sept. 8	158·4334	37	·6742	·169	·341	·848	·333
18	33·3229	36	·3472	·587	·990	·500	·358
28	268·2125	+·0036	·0202	·005	·638	·152	·382
Oct. 8	143·1020	35	·6932	·423	·286	·805	·407
18	17·9916	34	·3662	·842	·935	·457	·432
28	252·8812	34	·0392	·260	·583	·109	·456
Nov. 7	127·7707	33	·7123	·678	·231	·762	·481
17	2·6603	32	·3853	·096	·879	·414	·506
27	237·5498	+·0032	·0583	·515	·528	·066	·530
Dec. 7	112·4394	31	·7313	·933	·176	·718	·555
17	347·3290	30	·4043	·351	·824	·371	·580
27	222·2185	30	·0773	·769	·473	·023	·605
Jan. 6	97·1081	29	·7503	·188	·121	·675	·629
16	331·9976	29	·4233	·606	·769	·327	·654
26	206·8872	+·0028	·0964	·024	·418	·980	·679
Feb. 5	81·7768	27	·7694	·442	·066	·632	·703
15	316·6663	27	·4424	·861	·714	·284	·728
25	191·5559	26	·1154	·279	·363	·937	·753
Mar. 7	66·4454	25	·7884	·697	·011	·589	·777
17	301·3350	25	·4614	·115	·659	·241	·802
27	176·2246	+·0024	·1344	·534	·308	·893	·827
Apr. 6	51·1141	23	·8075	·952	·956	·546	·851
16	286·0037	23	·4805	·370	·604	·198	·876
26	160·8932	22	·1535	·788	·252	·850	·901
May 6	35·7828	21	·8265	·207	·901	·502	·925
16	270·6724	21	·4995	·625	·549	·155	·950
26	145·5619	+·0020	·1725	·043	·198	·807	·975

	Inclination. γ_1	Node. $O-\Gamma_1$		Inclination. γ_1	Node. $O-\Gamma_1$
1894 July 30	0°·0091	148°·0	1894 Dec. 27	0°·0093	156°·2
Aug. 29	91	149·6	1895 Jan. 26	93	157·8
Sept. 28	91	151·3	Feb. 25	93	159·4
Oct. 28	92	152·9	Mar. 27	93	161·0
Nov. 27	92	154·6	Apr. 26	94	162·6
Dec. 27	0·0093	156·2	May 26	0·0094	164·2

First Satellite. *Second Satellite.*

Greenwich Noon. 1894–95.	Arguments. ζ_1	η_1	θ_1	Longitude. l_2-O	S_2	Arguments. α_2	β_2
				°	°		
July 30	·903	·243	·065	122·0915	−·0067	·99107	·496
Aug. 9	·925	·264	·086	55·8388	68	·82757	·914
19	·947	·285	·106	349·5860	69	·66408	·332
29	·969	·306	·127	283·3333	70	·50058	·750
Sept. 8	·990	·326	·148	217·0805	71	·33709	·169
18	·012	·347	·168	150·8278	72	·17360	·587
28	·034	·368	·189	84·5750	−·0073	·01010	·005
Oct. 8	·056	·388	·209	18·3223	74	·84661	·423
18	·077	·409	·230	312·0696	74	·68312	·842
28	·099	·430	·251	245·8168	75	·51962	·260
Nov. 7	·121	·451	·271	179·5641	76	·35613	·678
17	·143	·471	·292	113·3113	77	·19264	·096
27	·164	·492	·312	47·0586	−·0077	·02914	·515
Dec. 7	·186	·513	·333	340·8058	78	·86565	·933
17	·208	·534	·354	274·5531	79	·70216	·351
27	·230	·554	·374	208·3004	79	·53866	·769
Jan. 6	·251	·575	·395	142·0476	80	·37517	·188
16	·273	·596	·415	75·7949	81	·21167	·606
26	·295	·617	·436	9·5421	−·0081	·04818	·024
Feb. 5	·317	·637	·457	303·2894	82	·88469	·442
15	·338	·658	·477	237·0366	82	·72119	·861
25	·360	·679	·498	170·7839	83	·55770	·279
Mar. 7	·382	·700	·518	104·5311	83	·39421	·697
17	·404	·720	·539	38·2784	84	·23071	·115
27	·425	·741	·560	332·0257	−·0084	·06722	·534
Apr. 6	·447	·762	·580	265·7729	85	·90373	·952
16	·469	·783	·601	199·5202	85	·74023	·370
26	·491	·803	·621	133·2674	86	·57674	·788
May 6	·512	·824	·642	67·0147	86	·41324	·207
16	·534	·845	·663	0·7619	86	·24975	·625
26	·556	·866	·683	294·5092	−·0087	·08626	·043

	Inclination. γ_2	Node. $O-\Gamma_2$
	°	° ′
1894 July 30	0·4845	155 37
Aug. 29	·4844	156·35
Sept. 28	·4843	157·33
Oct. 28	·4841	158·31
Nov. 27	·4840	159·28
Dec. 27	0·4839	160·26

Second Satellite.

Greenwich Noon. 1894-95.	Arguments. γ_2	δ_2	ϵ_2	ζ_2	η_2	θ_2	ι_2	κ_2	λ_2
July 30	·088	·748	·926	·903	·743	·565	·734	·234	·056
Aug. 9	·903	·564	·742	·925	·764	·586	·759	·092	·913
19	·717	·379	·558	·947	·785	·606	·784	·949	·771
29	·532	·195	·374	·969	·806	·627	·808	·806	·628
Sept. 8	·347	·011	·189	·990	·826	·648	·833	·663	·485
18	·162	·827	·005	·012	·847	·668	·858	·521	·342
28	·976	·642	·821	·034	·868	·689	·882	·378	·199
Oct. 8	·791	·458	·637	·056	·888	·709	·907	·235	·056
18	·606	·274	·453	·077	·909	·730	·932	·092	·913
28	·421	·090	·269	·099	·930	·751	·956	·950	·770
Nov. 7	·235	·905	·085	·121	·951	·771	·981	·807	·627
17	·050	·721	·901	·143	·971	·792	·006	·664	·484
27	·865	·537	·717	·164	·992	·812	·030	·521	·342
Dec. 7	·680	·353	·533	·186	·013	·833	·055	·379	·199
17	·494	·168	·349	·208	·034	·854	·080	·236	·056
27	·309	·984	·164	·230	·054	·874	·105	·093	·913
Jan. 6	·124	·800	·980	·251	·075	·895	·129	·950	·770
16	·939	·616	·796	·273	·096	·915	·154	·808	·627
26	·753	·432	·612	·295	·117	·936	·179	·665	·484
Feb. 5	·568	·247	·428	·317	·137	·957	·203	·522	·341
15	·383	·063	·244	·338	·158	·977	·228	·379	·198
25	·198	·879	·060	·360	·179	·998	·253	·237	·055
Mar. 7	·012	·695	·876	·382	·200	·018	·277	·094	·913
17	·827	·510	·692	·404	·220	·039	·302	·951	·770
27	·642	·326	·508	·425	·241	·060	·327	·808	·627
Apr. 6	·457	·142	·324	·447	·262	·080	·351	·666	·484
16	·271	·958	·139	·469	·283	·101	·376	·523	·341
26	·086	·773	·955	·491	·303	·121	·401	·380	·198
May 6	·901	·589	·771	·512	·324	·142	·425	·237	·055
16	·716	·405	·587	·534	·345	·163	·450	·095	·912
26	·530	·221	·403	·556	·366	·183	·475	·952	·769

	Inclination. γ_2	Node. $\odot-\Gamma_2$
	°	°
1894 Dec. 27	0·4839	160·26
1895 Jan. 26	·4838	161·23
Feb. 25	·4837	162·21
Mar. 27	·4836	163·18
Apr. 26	·4835	164·16
May 26	0·4834	165·13

Third Satellite.

Greenwich Noon. 1894–95.	Longitude. l_3-L	S_3	Arguments. α_3	β_3	γ_3	δ_3	ϵ_3
	°	°					
July 30	123·6997	−·0097	·7523	·9303	·4955	·210	·739
Aug. 9	266 8758	·0098	·1498	·3279	·9138	·008	·178
19	50·0519	·0099	·5473	·7256	·3320	·807	·617
29	193·2280	·0100	·9448	·1232	·7503	·605	·056
Sept. 8	336·4041	·0101	·3423	·5209	·1685	·404	·495
18	119·5802	·0102	·7398	·9185	·5868	·202	·934
28	262·7563	−·0102	·1373	·3162	·0051	·001	·373
Oct. 8	45·9324	·0103	·5348	·7139	·4233	·799	·812
18	189·1085	·0104	·9323	·1115	·8416	·598	·251
28	332·2846	·0105	·3299	·5092	·2598	·396	·690
Nov. 7	115·4607	·0106	·7274	·9068	·6781	·195	·129
17	258·6369	·0107	·1249	·3045	·0963	·993	·568
27	41·8130	−·0107	·5224	·7021	·5146	·792	·007
Dec. 7	184·9891	·0108	·9199	·0998	·9328	·590	·446
17	328·1652	·0108	·3174	·4975	·3511	·389	·885
27	111·3413	·0109	·7149	·8950	·7693	·187	·324
Jan. 6	254·5174	·0110	·1124	·2928	·1876	·986	·763
16	37·6935	·0110	·5100	·6904	·6058	·784	·202
26	180·8696	−·0111	·9075	·0881	·0241	·583	·641
Feb. 5	324·0457	·0111	·3050	·4857	·4423	·381	·080
15	107·2218	·0112	·7025	·8834	·8606	·180	·519
25	250 3979	·0112	·1000	·2811	·2789	·978	·958
Mar. 7	33·5740	·0113	·4975	·6787	·6971	·777	·397
17	176 7501	·0113	·8950	·0764	·1154	·575	·836
27	319·9262	−·0114	·2925	·4740	·5336	·374	·275
Apr. 6	103·1023	·0114	·6900	·8717	·9519	·173	·714
16	246·2784	·0114	·0876	·2693	·3701	·971	·153
26	29·4545	·0115	·4851	·6670	·7884	·770	·592
May 6	172·6306	·0115	·8826	·0647	·2066	·568	·031
16	315·8067	·0115	·2801	·4623	·6249	·367	·470
26	98·9828	−·0115	·6776	·8600	·0431	·165	·909

	Inclination. γ_3	Node. $\Omega-\Gamma_3$		Inclination. γ_3	Node. $\Omega-\Gamma_3$
	°	°		°	°
1894 July 30	0·1256	126·57	1894 Dec. 27	0·1254	127·81
Aug. 29	·1255	126·83	1895 Jan. 26	·1254	128·05
Sept. 28	·1255	127·08	Feb. 25	·1254	128·29
Oct. 28	·1254	127·32	Mar. 27	·1254	128·52
Nov. 27	·1254	127·57	Apr. 26	·1254	128·74
Dec. 27	0·1254	127·81	May 26	0·1255	128·96

Third Satellite. *Fourth Satellite.*

Greenwich Noon. 1894–95.	Arguments. ζ_3	η_3	θ_3	ι_3	Longitude. $l_4 - O$	S_4	Arg. α_4
					°	°	
30	·903	·243	·065	·592	228·2240	−·0320	·22060
Aug. 9	·925	·264	·086	·989	83·9347	·0323	·81975
19	·947	·285	·106	·385	299·6455	·0325	·41889
29	·969	·306	·127	·782	155·3562	·0327	·01803
Sept. 8	·990	·326	·148	·178	11·0669	·0329	·61717
18	·012	·347	·168	·575	226·7777	·0331	·21631
28	·034	·368	·189	·971	82·4884	−·0333	·81546
Oct. 8	·056	·388	·209	·368	298·1992	·0335	·41460
18	·077	·409	·230	·764	153·9099	·0336	·01374
28	·099	·430	·251	·161	9·6206	·0338	·61288
Nov. 7	·121	·451	·271	·557	225·3314	·0340	·21202
17	·143	·471	·292	·954	81·0421	·0341	·61117
27	·164	·492	·312	·350	296·7529	−·0343	·41031
Dec. 7	·186	·513	·333	·747	152·4636	·0344	·00945
17	·208	·534	·354	·143	8·1743	·0346	·60859
27	·230	·554	·374	·540	223·8851	·0347	·20773
Jan. 6	·251	·575	·395	·936	79·5958	·0348	·80688
16	·273	·596	·415	·333	295·3066	·0350	·40602
26	·295	·617	·436	·729	151·0173	−·0351	·00516
Feb. 5	·317	·637	·457	·126	6·7280	·0352	·60430
15	·338	·658	·477	·522	222·4388	·0353	·20344
25	·360	·679	·498	·919	78·1495	·0354	·80258
Mar. 7	·382	·700	·518	·315	293 8603	·0355	·40173
17	·404	·720	·539	·712	149·5710	·0356	·00087
27	·425	·741	·560	·108	5·2817	−·0356	·60001
Apr. 6	·447	·762	·580	·505	220·9925	·0357	·19915
16	·469	·783	·601	·901	76·7032	·0357	·79829
26	·491	·803	·621	·298	292·4140	·0358	·39744
May 6	·512	·824	·642	·694	148·1247	·0359	·99658
16	·534	·845	·663	·091	3·8354	·0359	·59572
26	·556	·866	·683	·487	219·5462	−·0359	·19486

1894.	Inclination. γ_4	Node. $O - \Gamma_4$
	°	°
July 30	0·3438	28·12
Aug. 29	·3433	28·13
Sept. 28	·3428	28·14
Oct. 28	·3424	28·16
Nov. 27	·3419	28·19
Dec. 27	0·3415	28·22

Fourth Satellite.

Greenwich Noon. 1894–95.	Arguments. β_4	γ_4	δ_4	ϵ_4	ζ_4	η_4	θ_4
July 30	·210	·543	·390	·610	·489	·705	·167
Aug. 9	·008	·142	·984	·804	·688	·922	·367
19	·807	·741	·579	·998	·888	·139	·566
29	·605	·340	·174	·192	·087	·355	·766
Sept. 8	·404	·939	·768	·386	·287	·572	·965
18	·202	·538	·363	·579	·486	·789	·165
28	·001	·137	·958	·773	·685	·006	·364
Oct. 8	·799	·736	·552	·967	·885	·223	·564
18	·598	·335	·147	·161	·084	·439	·763
28	·396	·934	·742	·354	·283	·656	·963
Nov. 7	·195	·533	·336	·548	·483	·873	·162
17	·993	·132	·931	·742	·682	·090	·362
27	·792	·731	·525	·936	·882	·306	·561
Dec. 7	·590	·330	·120	·130	·081	·523	·761
17	·389	·929	·715	·323	·280	·740	·960
27	·187	·528	·309	·517	·480	·957	·160
Jan. 6	·986	·127	·904	·711	·679	·173	·359
16	·784	·726	·499	·905	·878	·390	·559
26	·583	·325	·093	·098	·078	·607	·758
Feb. 5	·381	·924	·688	·292	·277	·824	·958
15	·180	·523	·283	·486	·477	·041	·157
25	·978	·122	·877	·680	·676	·257	·357
Mar. 7	·777	·721	·472	·874	·875	·474	·556
17	·575	·320	·066	·067	·075	·691	·756
27	·374	·919	·661	·261	·274	·908	·955
Apr. 6	·173	·518	·256	·455	·473	·124	·155
16	·971	·117	·850	·649	·673	·341	·355
26	·770	·716	·445	·842	·872	·558	·554
May 6	·568	·315	·040	·036	·071	·775	·754
16	·367	·914	·634	·230	·271	·991	·953
26	·165	·513	·229	·424	·470	·208	·153

	Inclination. γ_4	Node. $\odot-\Gamma_4$
	°	°
1894 Dec. 27	0·3415	28·22
1895 Jan. 26	·3410	28·26
Feb. 25	·3406	28·30
Mar. 27	·3402	28·34
Apr. 26	·3399	28·39
May 26	0·3395	28·45

Col. Cooper's Observatory:
Markree, Collooney, Ireland.

Ephemeris for Physical Observations of Jupiter,

Greenwich Noon.	Position-angle of ♃'s Axis. P	L−O	Diff.	B	A−L	Apparent Diameter. Equat.	Defect.	Polar.
1894.	°	°		°	°	″	″	″
Dec. 17	1·808	316·654	270	+2·181	− 1·236	46·81	0·01	43·80
19	1·682	316·384	272	2·181	−0·796	46·83	...	43·82
21	1·556	316·112	272	2·180	−0·354	46·84	...	43·83
23	1·429	315·840	272	2·180	+0·088	46·84	...	43·83
25	1·302	315·568	271	2·179	+0·530	46·82	...	43·81
27	1·175	315·297	269	+2·178	+0·970	46·78	...	43·78
29	1·050	315·028	266	2·178	1·409	46·73	·01	43·73
31	0·926	314·762	262	2·177	1·845	46·67	·01	43·67
1895.								
Jan. 2	0·803	314·500	258	2·176	2·277	46·60	·02	43·60
4	0·683	314·242	253	2·174	2·705	46·51	·03	43·52
6	0·565	313·989	246	+2·173	+3·127	46·40	0·03	43·42
8	0·450	313·743	240	2·171	3·543	46·29	·04	43·31
10	0·338	313·503	233	2·170	3·953	46·16	·05	43·20
12	0·229	313·270	225	2·168	4·355	46·02	·07	43·07
14	0·123	313·045	216	2·166	4·749	45·87	·08	42·92
16	0·022	312·829	207	+2·164	+5·135	45·71	0·09	42·77
18	359·925	312·622	198	2·161	5·511	45·54	·11	42·61
20	·833	312·424	187	2·159	5·878	45·35	·12	42·44
22	·746	312·237	177	2·156	6·235	45·16	·13	42·26
24	·663	312·060	165	2·153	6·581	44·96	·15	42·07
26	359·586	311·895	153	+2·150	+6·915	44·75	0·16	41·88
28	·514	311·742	142	2·147	7·238	44·53	·18	41·67
30	·448	311·600	129	2·144	7·548	44·31	·19	41·46
Feb. 1	·388	311·471	117	2·140	7·846	44·08	·21	41·25
3	·333	311·354	104	2·137	8·132	43·84	·22	41·03
5	359·284	311·250	91	+2·133	+8·405	43·60	0·23	40·80
7	·242	311·159	78	2·129	8·665	43·36	·25	40·57
9	·205	311·081	65	2·125	8·912	43·11	·26	40·34
11	·175	311·016	51	2·121	9·145	42·85	·27	40·10
13	·151	310·765	38	2·116	9·366	42·60	·28	39·86
15	359·133	310·927	25	+2·112	+9·573	42·34	0·29	39·62
17	·121	310·902	12	2·107	9·766	42·08	·30	39·38
19	·116	310·890	2	2·103	9·946	41·82	·31	39·13
21	·117	310·892	15	2·098	10·113	41·55	·32	38·88
23	·124	310·907	29	2·093	10·266	41·29	·33	38·64

1894–95. (*Concluded.*) By A. Marth.

Greenwich Noon.	Brightness.	Longitude of ☿'s Central Meridian. (877°·90) I.	(870°·27) II.	Corr. for Phase.	Light-time.	A − O	B
1894.	m	°	°	°	m	°	°
Dec. 17	−2·28	17·26	38·64	+0·01	34·593	315·4197	+2·1529
19	−2·28	333·34	339·46	·00	34·575	315·5898	2·1464
21	−2·28	289·41	280·28	...	34·569	315·7599	2·1399
23	−2·28	245·48	221·09	...	34·572	315·9299	2·1334
25	−2·28	201·55	161·89	...	34·587	316·0998	2·1268
27	−2·28	157·60	102·68	·00	34·612	316·2697	+2·1202
29	−2·28	113·65	43·47	−0·01	34·647	316·4395	2·1136
31	−2·27	69·69	344·25	·01	34·693	316·6093	2·1070
1895.							
Jan. 2	−2·27	25·71	285·02	·02	34·750	316·7791	2·1004
4	−2·26	341·73	225·78	·03	34·817	316·9488	2·0938
6	−2·26	297·74	166·52	−0·04	34·894	317·1185	+2·0872
8	−2·25	253·73	107·26	·05	34·981	317·2881	2·0805
10	−2·25	209·71	47·98	·07	35·078	317·4576	2·0738
12	−2·24	165·68	348·69	·08	35·184	317·6271	2·0671
14	−2·23	121·63	289·38	·10	35·300	317·7966	2·0604
16	−2·22	77·57	230·06	−0·12	35·425	317·9660	+2·0537
18	−2·21	33·50	170·73	·13	35·560	318·1353	2·0469
20	−2·20	349·41	111·38	·15	35·703	318·3046	2·0401
22	−2·19	305·30	52·01	·17	35·855	318·4739	2·0333
24	−2·18	261·18	352·63	·19	36·015	318·6431	2·0265
26	−2·17	217·04	293·24	−0·21	36·183	318·8123	+2·0197
28	−2·16	172·89	233·82	·23	36·360	318·9814	2·0129
30	−2·15	128·72	174·39	·25	36·544	319·1505	2·0061
Feb. 1	−2·14	84·53	114·95	·27	36·735	319·3195	1·9992
3	−2·13	40·33	55·49	·29	36·932	319·4885	1·9923
5	−2·11	356·11	356·01	−0·31	37·137	319·6574	+1·9854
7	−2·10	311·87	296·51	·33	37·347	319·8263	1·9785
9	−2·09	267·62	237·00	·35	37·563	319·9951	1·9716
11	−2·07	223·35	177·47	·36	37·785	320·1639	1·9647
13	−2·06	179·06	117·92	·38	38·013	320·3326	1·9577
15	−2·05	134·76	58·36	−0·40	38·245	320·5013	+1·9507
17	−2·03	90·44	358·78	·42	38·482	320·6699	1·9437
19	−2·02	46·10	299·19	·43	38·723	320·8385	1·9367
21	−2·00	1·75	239·58	·45	38·969	321·0070	1·9297
23	−1·99	317·38	179·95	·46	39·218	321·1755	1·9227

Greenwich Noon.	Position-angle of ♃'s Axis. P	L−O.	Diff.	B	A−L.	Apparent Diameter. Equat.	Defect.	Polar.
1895.	°	°		°	°	″	″	″
Feb. 25	359·137	310·936	42	+2·088	+10·406	41·02	0·34	38·39
27	·157	310·978	55	2·083	10·532	40·76	·34	38·14
Mar. 1	·183	311·033	68	2·078	10·646	40·50	·35	37·90
3	·215	311·101	81	2·073	10·746	40·24	·35	37·65
5	·253	311·182	93	2·067	10·833	39·98	·36	37·41
7	359·296	311·275	105	+2·061	+10·908	39·72	0·36	37·16
9	·345	311·380	118	2·056	10·971	39·46	·36	36·92
11	·401	311·498	130	2·050	11·021	39·20	·36	36·68
13	·462	311·628	142	2·044	11·059	38·95	·36	36·45
15	·528	311·770	153	2·038	11·085	38·70	·36	36·21
17	359·599	311·923	165	+2·032	+11·100	38·45	0·36	35·98
19	·676	312·088	176	2·026	11·103	38·21	·36	35·75
21	·758	312·264	186	2·019	11·095	37·97	·35	35·53
23	·846	312·450	198	2·013	11·076	37·73	·35	35·31
25	359·939	312·648	208	2·006	11·046	37·50	·35	35·09
27	0·036	312·856	218	+1·999	+11·006	37·27	0·34	34·87
29	0·138	313·074	228	1·992	10·955	37·04	·34	34·66
31	0·245	313·302	238	1·985	10·895	36·82	·33	34·45
Apr. 2	0·356	313·540	247	1·978	10·825	36·60	·33	34·25
4	0·472	313·787	257	1·971	10·745	36·39	·32	34·05
6	0·593	314·044	265	+1·964	+10·656	36·18	0·31	33·85
8	0·717	314·309	274	1·957	10·558	35·97	·30	33·66
10	0·845	314·583	282	1·949	10·451	35·77	·30	33·47
12	0·977	314·865	291	1·941	10·336	35·57	·29	33·29
14	1·113	315·156	298	1·933	10·212	35·38	·28	33·11
16	1·253	315·454	306	+1·925	+10·081	35·19	0·27	32·93
18	1·396	315·760	314	1·917	9·942	35·01	·26	32·76
20	1·543	316·074	321	1·909	9·796	34·83	·25	32·59
22	1·693	316·395	328	1·900	9·642	34·65	·24	32·43
24	1·846	316·723	335	1·891	9·481	34·48	·24	32·27
26	2·002	317·058	341	+1·883	+9·314	34·32	0·23	32·11
28	2·162	317·399	347	1·874	9·139	34·16	·22	31·96
30	2·325	317·746	354	1·865	8·958	34·00	·21	31·81
May 2	2·490	318·100	360	1·855	8·771	33·85	·20	31·67
4	2·658	318·460	365	1·846	8·578	33·70	·19	31·53
6	2·828	318·825	371	+1·836	+8·380	33·55	0·18	31·40
8	3·000	319·196	376	1·827	8·176	33·42	·17	31·27
10	3·175	319·572		1·817	7·966	33·28	·16	31·14

Greenwich Noon.	Brightness.	Longitude of ♃'s Central Meridian. (877°·90) I.	(870°·27) II.	Corr. for Phase.	Light-time.	A − 0.	B
1895.	m	°	°	°	m	°	°
Feb. 25	−1·98	273·00	120·31	−0·47	39·470	321·3439	+1·9157
27	−1·96	228·60	60·65	·48	39·726	321·5123	1·9087
Mar. 1	−1·95	184·19	0·98	·49	39·984	321·6806	1·9016
3	−1·93	139·76	301·30	·50	40·244	321·8489	1·8945
5	−1·92	95·32	241·60	·51	40·507	322·0171	1·8874
7	−1·90	50·87	181·88	−0·52	40·771	322·1853	+1·8803
9	−1·89	6·40	122·16	·52	41·037	322·3534	1·8731
11	−1·87	321·92	62·42	·53	41·304	322·5215	1·8660
13	−1·86	277·43	2·67	·53	41·572	322·6895	1·8588
15	−1·85	232·92	302·90	·53	41·840	322·8575	1·8516
17	−1·83	188·41	243·13	−0·54	42·109	323·0254	+1·8444
19	−1·82	143·88	183·34	·54	42·378	323·1933	1·8372
21	−1·80	99·34	123·54	·54	42·647	323·3611	1·8300
23	−1·79	54·79	63·73	·53	42·915	323·5289	1·8228
25	−1·78	10·23	3·91	·53	43·183	323·6966	1·8156
27	−1·76	325·66	304·09	−0·53	43·450	323·8643	+1·8084
29	−1·75	281·08	244·25	·52	43·716	324·0319	1·8011
31	−1·73	236·49	184·40	·52	43·980	324·1995	1·7938
Apr. 2	−1·72	191·89	124·54	·51	44·242	324·3671	1·7865
4	−1·71	147·28	64·68	·50	44·503	324·5346	1·7792
6	−1·70	102·67	4·81	−0·49	44·761	324·7020	+1·7719
8	−1·68	58·05	304·93	·48	45·017	324·8694	1·7646
10	−1·67	13·42	245·04	·47	45·271	325·0367	1·7573
12	−1·66	328·78	185·14	·46	45·521	325·2040	1·7499
14	−1·65	284·14	125·24	·45	45·769	325·3713	1·7425
16	−1·64	239·49	65·34	−0·44	46·014	325·5385	+1·7351
18	−1·62	194·84	5·43	·43	46·256	325·7056	1·7277
20	−1·61	150·18	305·51	·42	46·494	325·8727	1·7203
22	−1·60	105·52	245·59	·41	46·729	326·0398	1·7129
24	−1·59	60·85	185·66	·39	46·960	326·2068	1·7055
26	−1·58	16·18	125·73	−0·38	47·187	326·3737	+1·6980
28	−1·57	331·50	65·79	·36	47·410	326·5406	1·6906
30	−1·56	286·82	5·85	·35	47·629	326·7075	1·6831
May 2	−1·55	242·13	305·91	·34	47·843	326·8743	1·6756
4	−1·54	197·44	245·96	·32	48·052	327·0411	1·6681
6	−1·53	152·75	186·01	−0·31	48·257	327·2078	+1·6606
8	−1·52	108·06	126·06	·29	48·458	327·3744	1·6531
10	−1·51	63·37	66·10	·28	48·653	327·5410	1·6456

The following is a list (continued from p. 569) of Greenwich mean times when the zero-meridian in the assumed two systems of longitudes will pass the middle of the illuminated disc:

	I. (877°·90)	II. (870°·27)		I. (877°·90)	II. (870°·27)
1894.	h m	h m	1895.	h m	h m
Dec. 17	9 22·1	8 51·6	Jan. 3	4 49·2	7 50·9
	19 12·5	18 47·2		14 39·6	17 46·5
18	5 2·9	4 42·8	4	10 20·4	3 42·1
	14 53·3	14 38·4		20 10·9	13 37·7
19	10 34·1	10 29·5	At 23h·4 ♂ of ♃ with ✶ 4m.1		
	20 24·5	20 25·1	1 Geminorum.		
20	6 15·0	6 20·7	5	6 1·3	9 28·9
	16 5·4	16 16·3		15 51·7	19 24·6
21	1 55·8	2 11·9	6	1 42·2	5 20·2
	11 46·2	12 7·5		11 32·6	15 15·8
22	7 27·0	7 58·6	7	7 13·5	1 11·4
	17 17·4	17 54·2		17 3·9	11 7·0
23	3 7·8	3 49·8	8	2 54·4	6 58·2
	12 58·2	13 45·4		12 44·8	16 53·9
24	8 39·0	9 36·6	9	8 25·7	2 49·5
	18 29·4	19 32·2		18 16·2	12 45·1
25	4 19·9	5 27·8	10	4 6·6	8 36·3
	14 10·3	15 23·3		13 57·1	18 32·0
26	9 51·1	1 18·9	11	9 38·0	4 27·6
	19 41·5	11 14·5		19 28·4	14 23·2
27	5 31·9	7 5·7	12	5 18·9	0 18·8
	15 22·4	17 1·3		15 9·3	10 14·5
28	1 12·8	2 56·9	13	0 59·8	6 5·7
	11 3·2	12 52·5		10 50·2	16 1·4
29	6 44·0	8 43·7	14	6 31·1	1 57·0
	16 34·5	18 39·3		16 21·6	11 52·6
30	2 24·9	4 34·9	15	2 12·0	7 43·9
	12 15·3	14 30·5		12 2·5	17 39·5
31	7 56·2	10 21·7	16	7 43·4	3 35·2
	17 46·6	20 17·3		17 33·9	13 30·8
1895.					
Jan. 1	3 37·0	6 12·9	17	3 24·3	9 22·1
	13 27·4	16 8·5		13 14·8	19 17·7
2	9 8·3	2 4·1	18	8 55·7	5 13·4
	18 58·7	11 59·7		18 46·2	15 9·0

	I. (877°·90)	II. (870°·27)
1895.	h m	h m
Jan. 19	4 36·7	1 4·7
	14 27·1	11 0·3
20	0 17·6	6 51·6
	10 8·1	16 47·3
21	5 49·0	2 42·9
	15 39·5	12 38·6
22	1 30·0	8 29·9
	11 20·5	18 25·5
23	7 1·4	4 21·2
	16 51·9	14 16·8
24	2 42·4	0 12·5
	12 32·9	10 8·2
25	8 13·8	5 59·5
	18 4·3	15 55·1
26	3 54·8	1 50·8
	13 45·3	11 46·5
27	9 26·3	7 37·8
	19 16·8	17 33·5
28	5 7·3	3 29·2
	14 57·8	13 24·8
29	0 48·3	9 16·2
	10 38·8	19 11·8
30	6 19·8	5 7·5
	16 10·3	15 3·2
31	2 0·8	0 58·9
	11 51·3	10 54·6
Feb. 1	7 32·3	6 45·9
	17 22·8	16 41·6
2	3 13·3	2 37·3
	12 3·8	12 33·0
3	8 44·8	8 24·4
	18 35·3	18 20·0
4	4 25·8	4 15·7
	14 16·4	14 11·4
5	0 6·9	0 7·1
	9 57·4	10 2·8
6	5 38·4	5 54·2

	I. (877°·90)	II. (870°·27)
1895.	h m	h m
Feb. 6	15 29·0	15 49·9
7	1 19·5	1 45·6
	11 10·0	11 41·3
8	6 51·0	7 32·7
	16 41·6	17 28·4
9	2 32·1	3 24·1
	12 22·6	13 19·8
10	8 3·7	9 11·2
	17 54·2	19 6·9
11	3 44·7	5 2·7
	13 35·3	14 58·4
12	9 16·4	0 54·1
	19 6·9	10 49·8
13	4 57·4	6 41·2
	14 48·0	16 36·9
14	0 38·5	2 32·7
	10 29·1	12 28·4
15	6 10·1	8 19·8
	16 0·7	18 15·5
16	1 51·2	4 11·3
	11 41·8	14 7·0
17	7 22·9	9 58·4
	17 13·4	19 54·2
18	3 4·0	5 49·9
	12 54·5	15 45·6
19	8 35·6	1 41·4
	18 26·2	11 37·1
20	4 16·7	7 28·5
	14 7·3	17 24·3
21	9 48·4	3 20·0
	19 39·0	13 15·8
22	5 29·5	9 7·2
	15 20·1	19 3·0
23	1 10·7	4 58·7
	11 1·2	14 54·5
24	6 42·4	0 50·2
	16 32·9	10 45·9

	I. (877°·90)	II. (870°·27)
1895.	h m	h m
Feb. 25	2 23·5	6 37·4
	12 14·1	16 33·2
26	7 55·2	2 28·9
	17 45·8	12 24·7
27	3 36·3	8 16·2
	13 26·9	18 11·9
28	9 8·1	4 7·7
	18 58·6	14 3·4
Mar. 1	4 49·2	9 54·9
	14 39·8	19 50·7
2	0 30·4	5 46·5
	10 21·0	15 42·2
3	6 2·1	1 38·0
	15 52·7	11 33·7
4	1 43·3	7 25·3
	11 33·9	17 21·0
5	7 15·0	3 16·8
	17 5·6	13 12·5
6	2 56·2	9 4·1
	12 46·8	18 59·8
7	8 28·0	4 55·6
	18 18·6	14 51·4
8	4 9·2	0 47·2
	13 59·8	10 42·9
9	9 40·9	6 34·5
	19 31·5	16 30·2
10	5 22·1	2 26·0
	15 12·7	12 21·8
11	1 3·3	8 13·3
	10 53·9	18 9·1
12	6 35·1	4 4·9
	16 25·7	14 0·7
13	2 16·3	9 52·2
	12 6·9	19 48·0
14	7 48·1	5 43·8
	17 38·7	15 39·6

	I. (877° 90)	II. (870°·27)
1895.	h m	h m
Mar. 15	3 29·4	1 35·4
	13 20·0	11 31·1
16	9 1·2	7 22·7
17	4 42·4	3 14·3
	14 33·0	13 10·1
18	10 14·2	9 1·7
19	5 55·4	4 53·3
	15 46·1	14 49·0
20	1 36·7	0 44·8
	11 27·3	10 40·6
21	7 8·5	6 32·2
22	2 49·7	2 23·6
	12 40·4	12 19·6
23	8 21·6	8 11·2
24	4 2·8	4 2·8
	13 53·5	13 58·6
25	9 34·7	9 50·2
26	5 15·9	5 41·8
	15 6·6	15 37·6
27	0 57·2	1 33·4
	10 47·8	11 29·2
28	6 29·1	7 20·8
29	2 10·3	3 12·4
	12 1·0	13 8·2
30	7 42·2	8 59·9
31	3 23·5	4 51·5
	13 14·1	14 47·3
Apr. 1	8 55·4	10 38·9
2	4 36·6	6 30·5
3	0 17·9	2 22·2
	10 8·5	12 18·0
4	5 49·8	8 9·6
5	1 31·1	4 1·2
	11 21·7	13 57·0
6	7 3·0	9 48·7
7	2 44·3	5 40·3

	I. (877°·90)	II. (870°·27)		I. (877°·90)	II. (870°·27)
1895.	h m	h m	1895.	h m	h m
Apr. 7	12 34·9	15 36·1	Apr. 20	5 44·9	11 26·7
8	8 16·2	11 27·8	21	1 26·2	7 18·4
9	3 57·5	7 19·4	22	6 58·2	13 5·9
10	9 29·4	13 6·9	23	2 39·5	8 57·5
11	5 10·7	8 58·5	24	8 11·4	4 49·2
12	0 52·0	4 50·1	25	3 52·7	10 36·7
	10 42·6	14 46·0	26	9 24·7	6 28·4
13	6 23·9	10 37·6	27	5 6·0	12 15·9
14	2 5·2	6 29·3	28	10 38·0	8 7·5
15	7 37·1	12 16·8	30	11 51·3	9 46·7
16	3 18·4	8 8·4	May 1	7 32·6	5 38·4
17	8 50·4	13 55·9	2	13 4·6	11 25·9
18	4 31·7	9 47·5	3	8 45·9	7 17·6
19	10 3·6	5 39·2	5	9 59·2	8 56·8

The intervals between successive passages of the zero-meridian vary in System I. between $9^h\ 50^m{\cdot}40$ and $50^m{\cdot}66$, and in II. between $9^h\ 55^m{\cdot}58$ and $55^m{\cdot}84$. The differences of successive values of the longitudes of ♃'s Central Meridian for the intervals of two days vary in System I. between 1755°·31 and 1756°·10, and in II. between 1740°·04 and 1740°·84.

The jovicentric latitudes B of the Earth above the plane of *Jupiter's* equator on pp. 562 and 564 are by mistake 0°·004 too small, or the values there given require a correction of +0°·004.

The formulæ for computing the apparent positions of markings on the planet's spheroidal surface are given on p. 159. If y is the distance of a belt from the centre of the disc measured along the polar semi-axis b of the disc, the latitude β' of the belt is found by means of

$$\sin(\beta' - B') = \frac{y}{b}$$

where the values of B′ are

1894 July	30	+2°·59	1894 Nov.	7	+2°·34	1895 Feb.	15	+2°·26
Aug.	19	2·52		27	2·33	Mar.	7	2·20
Sept.	8	2·45	Dec.	17	2·33		27	2·14
	28	2·39	1895 Jan.	6	2·32	Apr.	16	2·06
Oct.	18	+2·35		26	+2·30	May	6	+1·96

Though the conjunction of *Jupiter* with the star 1 *Geminorum* $4^m{\cdot}3$ on January 4 is not a very close one, the passage of the planet's system within 1′ of a bright star is rare enough to

render the occurrence one of some interest and worth watching. Assuming the apparent place of the star to be—

$$\alpha\ 5^h\ 57^m\ 45^s{\cdot}81 \quad \delta + 23^\circ\ 16'\ 15''{\cdot}7$$

the planet and its four satellites in their retrograde course will pass the star in right-ascension in the following order :—

	h	m	
1895 Jan. 4	11	5 Gr.	Sat. III. 56″·6 south of ✶
	17	14	Sat. I. 48″·2 „ „
	22	9	Preceding limb
	23	23	Centre of ♃ 44″·8 south of ✶, so that the north rim of the disc passes at a distance of 23″.
5	0	37	Following limb
	9	5	Sat. II. 49″·9 south of ✶
6	1	53	Sat. IV. 52″·2 „ „

Further details may be gathered from the following apparent differences of right-ascension and declination between the satellites and the centre of *Jupiter*, which are founded upon the data in the next paper and the tables in vol. li. :—

Sat. III.

1895.	G.M.T. h	m	α_3−A. s	δ_3−D. ″
Jan. 4	8	0	−14·693	−9·25
	9		15·450	8·83
	10		16·185	8·41
	11		16·898	7·97
	12		17·589	7·53
	13		18·255	7·07
	14	0	−18·896	−6·60

Sat. II.

1895.	G.M.T. h	m	α_2−A. s	δ_2−D. ″
Jan. 5	6	0	+14·936	−6·39
	7		14·490	6·99
	8		13·963	7·55
	9		13·359	8·07
	10		12·682	8·54
	11		11·936	8·97
	12	0	+11·124	−9·34

Sat. I.

			α_1−A. s	δ_1−D. ″
	16	0	− 7·323	−2·44
		20	7·651	2·18
		40	7·960	1·92
	17	0	8·250	1·67
		20	8·519	1·42
		40	8·767	1·16
	18	0	8·994	0·89
		20	9·199	0·62
		40	− 9·380	−0·35

Sat. IV.

			α_4−A. s	δ_4−D. ″
6	0	0	+36·982	−14·68
		1	36·570	14·92
		2	36·152	15·16
		3	35 726	15·39
		4	35·290	15·62
		5	34·843	15·85
		6 0	+34·385	−16·08

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